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Group Art Unit: 2621

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Attorney Docket No. PD-201157

Please find attached Re:

Serial No.: 10/074,765

Filed on: February 12, 2002

- TRANSMITTAL FORM PTO/SB/21 (1 page)
- SUBSTITUTE APPEAL BRIEF IN SUPPORT OF NOTICE OF APPEAL DATED MAY 1, 2006 AND NOTICE OF NON-COMPLIANT APPEAL BRIEF DATED MAY 7, 2007 (18 pages)

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PTO/SB/21 (04-07)

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:	Ashish BANERJI et al.) Examiner:	Vo, T.
)	
Application No.:	10/074,765) Group Art Unit:	2621
)	
Filed:	February 12, 2002)	
)	
For:	SYSTEM AND METHODOLOGY FOR VIDEO COMPRESSION) May 31, 2007	
)	
) Attorney Docket No.	PD-201157

Mail Stop Appeal Brief - Patents
Commissioner for Patents
Alexandria, VA 22313-1450

SUBSTITUTE APPEAL BRIEF

Sir:

This Appeal Brief is submitted in support of the Notice of Appeal dated May 1, 2006, and in response to the Notification of Non-compliant Appeal Brief dated May 7, 2007.

I. REAL PARTY IN INTEREST

The DirecTV Group, Inc. is the real party in interest.

II. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any related appeals and interferences.

III. STATUS OF THE CLAIMS

Claims 1-23 are pending in this appeal. No claim is allowed. This appeal is therefore taken from the final rejection of claims 1-23 on January 31, 2006.

IV. STATUS OF AMENDMENTS

No amendment to claims has been filed after final rejection.

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V. SUMMARY OF THE CLAIMED SUBJECT MATTER

Independent method claim 1.

Independent claim 1 is directed to a method of compressing video. The claimed method comprises grouping video frames that are only between consecutive I-frames into a video data set. (See, for example, Specification ¶ 8, page 3, line 2; and ¶ 55, page 16, line 2) The claimed method comprises splitting the video data set into a plurality of homogeneous files. (See, for example, Specification ¶ 8, page 3, lines 3-4; ¶ 10, page 3, lines 1-2; and ¶ 26, page 7, line 3) The claimed method comprises individually compressing each of the homogeneous files. (See, for example, Specification ¶ 8, page 3, lines 3-4; and ¶ 55, page 16, line 4)

Independent system claim 17

Independent claim 17 is directed to a video compression system. The claimed system comprises means for grouping video frames that are only between consecutive I-frames into a video data set. (See, for example, Specification ¶ 8, page 3, line 2; and ¶ 55, page 16, line 2; and FIGs. 1, 2 and 6) The claimed system comprises means for splitting the video data set into a plurality of homogeneous files. (See, for example, Specification ¶ 8, page 3, lines 3-4; ¶ 10, page 3, lines 1-2; ¶ 26, page 7, line 3; and FIGs. 3, 4, 5 and 6) The claimed system comprises means for individually compressing each of the homogeneous files. (See, for example, Specification ¶ 8, page 3, lines 3-4; ¶ 55, page 16, line 4; and FIGs. 1 and 6)

Independent method claim 19

Independent claim 19 is directed to a method of compressing video. The claimed method comprises grouping video frames that are only between two consecutive I-frames into a video

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data set. (See, for example, Specification ¶ 8, page 3, line 2; and ¶ 55, page 16, line 2) The claimed method comprises splitting the video data set into a plurality of individual data sequences. (See, for example, Specification ¶ 8, page 3, lines 3-5) The claimed method comprises individually compressing each of the individual data sequences. (See, for example, Specification ¶ 8, page 3, lines 4-5 and ¶ 55, page 16, lines 3-4)

Independent method claim 21

Independent claim 21 is directed to a method of compressing video. The claimed method comprises splitting the video data set consisting of non-intra video frames into a plurality of data sequences. (See, for example, Specification ¶ 26, page 7, lines 5-9) The claimed method comprises individually compressing each of the files, wherein at least one of the data sequences contains information from each of the non-intra video frames. (See, for example, Specification ¶ 5, page 2, lines 1-13; ¶ 22, page 5, lines 1-8 and ¶ 26, page 7, lines 5-11)

Independent method claim 22

Independent claim 22 is directed to a method of compressing a video signal. The claimed method comprises grouping video frames of the video signal that are only between consecutive I-frames into a video data set. (See, for example, Specification ¶ 8, page 3, line 2; and ¶ 55, page 16, line 2) The claimed method comprises splitting the video data set into a plurality of individual data sequences. (See, for example, Specification ¶ 8, page 3, lines 3-5) The method claim comprises individually compressing each of the individual data sequences. (See, for example, Specification ¶ 8, line 4 and ¶ 55, page 16, lines 3-4)

The present invention addresses long-felt needs associated with video compression, especially with the compression efficiency in motion-compensated transform-based video encoders. The large data size of video content presents a formidable challenge to the

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consumer acceptance of digital video technology. For example, a two-hour motion picture requires more than 8 trillion bytes of uncompressed video data, so the feasibility of digital video technology depends on how well this mass of data can be compressed. (See, for example, Specification ¶ 3, page 1, lines 1-8)

One form of video compression is premised on the fact that, in video for motion pictures, only a portion of the video actually changes from frame-to-frame. Accordingly, with "motion-compensated" video compression, only the differences between different frames are encoded into special frames called "predictive frames" (P-frames) and "bidirectionally predictive frames" (B-frames). Frames that are coded without any reference to a previously coded frame are known as "intra frames" (I-frames). (See, for example, Specification ¶ 5, page 2, lines 1-13) After the video compression by motion compensation has been performed, other forms compression such as discrete cosine transformation (DCT) and run-length encoding are applied to further reduce the size of the video data set. (See, for example, Specification ¶ 6, page 2, lines 1-8; ¶ 7, page 2, lines 1-5)

The present invention addresses this need with the realization that post-motion compensation compression can be fine-tuned by exploiting commonalities in the I-frame data versus the non-I-frame data (e.g. P- and B-frames). (See, for example, Specification ¶ 8, page 3, line 2; ¶ 9, page 3, lines 7-8; and ¶ 10, page 3, line 3) In one aspect of the present invention, video frames that are only between consecutive I-frames (claims 1, 17, 19, 22) or are otherwise consisting of non-intra video frames (claim 21) are grouped into a video data set. (See, for example, Specification ¶ 22, page 5, lines 2-3; FIG. 1, 101) The video data set is split into a plurality of data sequences (claims 19 and 21-22) or homogeneous files (claims 1 and 17) and individually compressed (claims 1, 17, 19, and 21-22). (See, for example, Specification ¶ 22, page 5, lines 4-8; and FIG. 1, 107, 109)

In some embodiments, the video data file may be split by "storing horizontal components of the video data set and vertical components of the video data set in separate files" (claim 4).

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(See, for example, Specification ¶ 29, page 7, lines 5-6) As another example, the compression may include "applying a grammar-based code" (claim 9), such as the "YK algorithm" (claim 10). (See, for example, Specification ¶ 34, page 8, line 1; ¶ 38, page 10, lines 1-12) In still another embodiment, the separate files may be prefixed a corresponding header indicating the file's size (claim 15). (See, for example, Specification ¶ 44, page 12, lines 5-6)

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 1-3, 5, 7, 12, 14, and 16-23 are anticipated under 35 U.S.C. § 102 by *Gonzales et al.* (US 5,414,469)?

Whether claims 1-3, 11-14, and 16-23 are anticipated under 35 U.S.C. § 102 by *Wu et al.* (US 6,700,933)?

Whether claims 4 and 16 are obvious under 35 U.S.C. § 103 based on *Wu et al.* in view of *Camahan* (US 5,414,780)?

Whether claims 6-7 and 16 are obvious under 35 U.S.C. § 103 based on *Wu et al.* in view of *Kato et al.* (US 5,719,986)?

Whether claims 8 and 16 are obvious under 35 U.S.C. § 103 based on *Wu et al.* in view of *Weinberger et al.* (US 5,680,129)?

Whether claims 9-10 are obvious under 35 U.S.C. § 103 based on *Wu et al.* in view of *Moroney et al.* (US 5,771,239)?

Whether claims 15-16 are obvious under 35 U.S.C. § 103 based on *Wu et al.* in view of *Chujoh et al.* (US 5,771,239)?

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VII. ARGUMENT

A. CLAIMS 1-3, 5, 7, 12, 14, AND 16-23 ARE NOT ANTICIPATED BY *GONZALES ET AL.*

To anticipate, every element and limitation of the claimed invention must be found in a single prior art reference, arranged as in the claim. *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383, 58 USPQ2d 1286, 1291 (Fed. Cir. 2001); *Scripps Clinic & Research Foundation v. Genentech, Inc.*, 927 F.2d 1565, 1576, 18 USPQ2d 1001, 1010 (Fed. Cir. 1991).

1. *Gonzales et al.* fails to disclose "splitting the video data set consisting of non-intra video frames into a plurality of data sequences" as set forth in claim 21.

Reversal of the rejection of claim 21 with respect to *Gonzales et al.* is respectfully requested because *Gonzales et al.* fails to disclose the limitations of claim 21. For example claim 21 recites "splitting the video data set consisting of non-intra video frames into a plurality of data sequences" (emphasis added). This feature is not shown in *Gonzales et al.*

Rather, *Gonzales et al.* is directed to a "system and method for processing a stream of video image data so as to create a video representation that multiplexes data corresponding to resolution or bit-stream scales" (Abstract). In particular, *Gonzales et al.* discloses that a video sequence "is subdivided into sets of consecutive pictures, each known as a Group of Pictures (GOP)" (col. 3:3-4). This GOP is what the Examiner equates to the claimed "video data set" in the Office Action of Sep. 14, 2005, p. 3. *Gonzales et al.* further explains that "[e]ach GOP must start with an I-picture and additional I-pictures can appear within the GOP" (col. 3:43-44, emphasis added).

By contrast, claim 21 recites a "video data set consisting of non-intra video frames." Since the *Gonzales et al.* GOP must begin with an I-picture and may even include additional ones, *Gonzales et al.* does not disclose, and even teaches against, a video data "consisting of" non-intra video frames. Thus, *Gonzales et al.* does not anticipate the express limitations of claim 21.

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The Examiner's response to arguments in the final Office Action of Jan. 31, 2006, does not strengthen the rejection. In fact, the Examiner noted that "each group GOP must start with an I-picture (frame) and additional I-pictures (frames) can appear within the GOP" (p. 5) and that GOP may include some "non-intra frames (P-frames of fig. 5; see MPEP 803.02[R-3] * Markush Claims)". The Examiner's curious citation to a section of the MPEP dealing with Markush claims demonstrates confusion about the claim terminology "consisting of" in claim 21. Contrary to the Examiner's citation to the MPEP, "consisting of" in claim 21 does not define a Markush group; rather, it requires the video data set to not include intra video frames. Because *Gonzales et al.* requires an I-picture in its GOP, the language of claim 21 does not read on *Gonzales et al.*

Accordingly, the rejection of claim 21 as anticipated by *Gonzales et al.* should be reversed.

2. *Gonzales et al.* fails to disclose "grouping video frames that are only between consecutive I-frames into a video data set" as required by claims 1-3, 5, 7, 12, 14, 16-20, and 22-23.

The Examiner's rejection of independent claims 1-3, 5, 7, 12, 14, 16-20, and 22-23 over *Gonzales et al.* also lacks merit. These claims recite "grouping video frames that are **only** between consecutive I-frames into a video data set" (emphasis added). However, as explained above, *Gonzales et al.* fails to disclose grouping video frames that are "only between consecutive I-frames" because its GOP "must start with an I-picture" (col. 3:33, emphasis added). An I-picture is not a video frame this is found "only" between consecutive I-frames, as independent claims 1, 17, 19, and 22 recite.

The Examiner's rejections of independent claims 1, 17, 19, and 22 over *Gonzales et al.* have consistently been ignoring the claim term "only." In the Office Action of Sep. 14, 2005, p. 3, the Examiner stated that *Gonzales et al.* comprises "means (fig. 1) for grouping video frames that are between consecutive I-frames (col. 3) into a video data set as a plurality of data

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sequences (GOP n and GOP n+1 of fig. 1)." Though the Examiner appears to be closely paraphrasing the language of claims 1, 17, 19, and 22, the Examiner's rendition is missing the word "only," the very term that distinguishes *Gonzales et al.* from the claimed subject matter. The word "only" is conspicuously missing from the Examiner's response to arguments in the final Office Action of Jan. 31, 2006, p. 5 as well: "Gonzales discloses a video compression system ... wherein grouping video frames that are between consecutive I-frames."

However, every word in a claim must be considered in judging the patentability of that claim against the prior art. *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). Since the rejection of claims 1-3, 5, 7, 12, 14, 16-20, and 22-23 failed to consider the crucial term "only," the rejections of these claims over *Gonzales et al.* should be reversed.

B. CLAIMS 1-3, 11-14, AND 16-23 ARE NOT ANTICIPATED BY *WU ET AL.*

1. *Wu et al.* does not disclose "grouping video frames that are only between consecutive I-frames into a video data set" as required by 1-3, 11-14, 16-20, and 22-23.

The Examiner's rejection of claims 1-3, 11-14, 16-20, and 22-23 over *Wu et al.* should be reversed because *Wu et al.* fails to disclose the limitations of independent claims 1, 17, 19, and 22, for example, "grouping video frames that are **only** between consecutive I-frames into a video data set" (emphasis added). As with *Gonzales et al.*, *Wu et al.* too fails to disclose this feature.

Wu et al. relates to a video encoding scheme that "employs progressive fine-granularity layered coding to encode video data frames into multiple layer," an embodiment of which is shown in FIG. 8 and described as follows (emphasis added):

At step 150, the encoder 80 encodes each macroblock in a reference or intraframe (or "I-frame") into different layers. With reference to FIG. 4, suppose that frame 1 is an I-frame, and the encoder 80 forms the base and three enhancement layers 102-108. At step 152, the encoder 80 encodes each predicted frame (or "P-frame") into different layers. Suppose that frame 2 is a P-frame. The encoder 80 encodes the base layer 102 of frame 2 according to

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conventional techniques and encodes the enhancement layers 104-108 of frame 2 according to the relationship $L \bmod N = i \bmod M$.

At step 154, the encoder evaluates whether there are any more P-frames in the group of P-frames (GOP). If there are (i.e., the "yes" branch from step 154), the next P-frame is encoded in the same manner. Otherwise, all P-frames for a group have been encoded (step 156).

The process continues until all I-frames and P-frames have been encoded, as represented by the decision step 158. Thereafter, the encoded bitstream can be stored in its compressed format in video storage 70 and/or transmitted from server 74 over the network 64 to the client 66 (step 160).

This passage, cited by the Examiner, is silent on the feature of "grouping video frames that are **only** between consecutive I-frames into a video data set" (emphasis added). By contrast, *Wu et al.* describes a system that encodes each macro block in a GOP comprising an I-frame and a number of P-frames.

As with *Gonzales et al.*, the Examiner's careful paraphrase of the claims in rejecting them over *Wu et al.* studiously ignores the word "only" (Office Action of Sep. 14, 2005, p. 4): "means (150, 152 of fig. 8, Note P frames in GOP that are between I-frames (158 of fig. 8)) for grouping video frames that are between consecutive I-frames into a video data set as a plurality of data sequences (P-Frames in GOP 154 of fig. 8)." The Examiner's response to arguments in the final Office Action of Jan. 31, 2006, p. 5, is that the "GOP includes P and B frames that are **only** between consecutive I-frames." However, the claims require "only" those frames to be grouped—contradicted by the inclusion of the I-frame in *Wu et al.*—not that some of the frames meet the recitation.

Accordingly, the rejection of claims 1-3, 11-14, 16-20, and 22-23 based on *Wu et al.* should be reversed.

2. *Wu et al.* fails to disclose "splitting the video data set consisting of non-intra video frames into a plurality of data sequences" as set forth in claim 21.

The Examiner's rejection of independent claims 21 over *Wu et al.* is also deficient. As explained above, *Wu et al.* fails to disclose grouping video frames that are "only between

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consecutive I-frames" and, accordingly, also fails to disclose "splitting the video data set consisting of non-intra video frames into a plurality of data sequences."

Thus, the reversal of the rejection claim 21 as anticipated by *Wu et al.* is respectfully requested.

C. CLAIMS 4 AND 16 ARE NOT RENDERED OBVIOUS BY *WU ET AL.* OVER *CARNAHAN*.

The initial burden of establishing a prima facie basis to deny patentability to a claimed invention under any statutory provision always rests upon the Examiner. *In re Mayne*, 104 F.3d 1339, 41 USPQ2d 1451 (Fed. Cir. 1997); *In re Deuel*, 51 F.3d 1552, 34 USPQ2d 1210 (Fed. Cir. 1995); *In re Bell*, 991 F.2d 781, 26 USPQ2d 1529 (Fed. Cir. 1993); *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In rejecting a claim under 35 U.S.C. § 103, the Examiner is required to provide a factual basis to support the obviousness conclusion. *In re Warner*, 379 F.2d 1011, 154 USPQ 173 (CCPA 1967); *In re Lunsford*, 357 F.2d 385, 148 USPQ 721 (CCPA 1966); *In re Freed*, 425 F.2d 785, 165 USPQ 570 (CCPA 1970).

Claim 4 is patentable over *Wu et al.* for at least the same reason as Independent claim 1 as set forth above in section VII. B. The Examiner admits that *Wu et al.* fails to show "said splitting includes storing horizontal components of the video data set and vertical components of the video data set in separate files," as set forth in claim 4. The video data set is recited in claim 4's independent claim 1, as "grouping video frames that are only between consecutive I-frames into a video data set."

The Examiner's reliance on *Carnahan* for this feature is misplaced, however. *Carnahan* pertains to a "method and apparatus for transforming image data by recursively interleaving the data to generate blocks of component image coefficients having a form suitable for subsequent quantization, motion estimation, and/or coding." (Abstract). Thus, the horizontal and vertical operations cited by the Examiner actually occur prior to the creation of, much less the grouping, of "video frames that are only between consecutive I-frames into a video data set." *Carnahan*

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does not teach or suggest performing its operations subsequent to motion estimation and is therefore irrelevant to the subject matter recited in claim 4.

D. CLAIMS 9-10 ARE NOT RENDERED OBVIOUS BY *WU ET AL.* OVER *MORONEY ET AL.*

In addition to the reasons as set forth above in section VII. B. for independent claim 1, claims 9-10 are further patentable over *Wu et al.* because neither *Wu et al.* nor *Moroney et al.* disclose a compression that "includes applying a grammar-based code" (claim 9), such as the "YK algorithm" (claim 10). The Examiner admits these features are not in *Wu et al.* but is mistaken that *Moroney et al.* remedies *Wu et al.*'s deficiency of disclosure.

In particular, *Moroney et al.*, col. 1:37-38, merely states that MPEG uses a formal grammar ("syntax") "for the constructions of bitstreams to be transmitted." *Moroney et al.* does not disclose, however, the use of a formal grammar for "compression," nor is there any disclosure whatsoever of the YK algorithm in *Moroney et al.* The Examiner's bald assertion that "the grammar encoding would obviously have YK algorithm to encode the homogeneous files" lacks evidentiary support.

E. CLAIMS 15-16 ARE NOT RENDERED OBVIOUS BY *WU ET AL.* OVER *CHUJOH ET AL.*

Claims 15-16 are further patentable over *Wu et al.* for at least the same reasons as independent claim 1 as set forth above in section VII. B. In addition, the Examiner admits that *Wu et al.* "does not particularly teach prefixing a corresponding header to each of the separate files, said header indicating a size of a corresponding separate file as claimed."

Chujoh et al., upon which the Examiner relies, also fails to show this feature. While FIGs. 41A, 41B, 42A, and 42B of *Chujoh et al.* appear to show some sort of header information, *Chujoh et al.* nowhere, and especially in col. 27:30-48 disclose that the header information includes the size of a corresponding separate file.

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F. CLAIMS 6-7 AND 16 ARE NON-OBVIOUS BY *WU ET AL.* OVER *KATO ET AL.*

Claims 6-7 and 16 are patentable over *Wu et al.* for at least the same reason as independent claim 1 as set forth above in section VII. B. Moreover, *Kato et al.* fails to teach "grouping video frames that are only between consecutive I-frames into a video data set," as recited in independent claim 1.

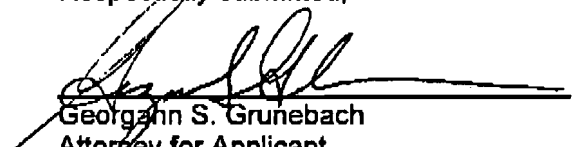
G. CLAIMS 8 AND 16 ARE NOT OBVIOUS OVER *WU ET AL.* AND *WEINBERGER ET AL.*

Claims 8 and 16 are patentable over *Wu et al.* for at least the same reason as independent claim 1 as set forth above in section VII. B. Moreover, *Weinberger et al.* fails to teach "grouping video frames that are only between consecutive I-frames into a video data set," as recited in independent claim 1.

CONCLUSION AND PRAYER FOR RELIEF

For the foregoing reasons, Appellants request the Honorable Board to reverse each of the Examiner's rejections.

Respectfully submitted,


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APPENDIX

1. A method of compressing video, comprising:
grouping video frames that are only between consecutive I-frames into a video data set;
splitting the video data set into a plurality of homogeneous files; and
individually compressing each of the homogeneous files.
2. A method according to claim 1, wherein the video frames include P-frames and B-frames.
3. A method according to claim 1, wherein said splitting includes storing mode information of the video data set and motion components in separate files.
4. A method according to claim 1, wherein said splitting includes storing horizontal components of the video data set and vertical components of the video data set in separate files.
5. A method according to claim 1, wherein said splitting includes storing B-frame components of the video data set and P-frame components of the video data set in separate files.
6. A method according to claim 1, wherein said splitting includes storing mode 3 B-frame components of the video data set and mode 0, 1, and 2 B-frame components of the video data set in separate files.
7. A method according to claim 1, wherein said splitting includes storing different color components of the video data set in different files.

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8. A method according to claim 1, further comprising mapping negative values in one of the homogeneous files into positive values.

9. A method according to claim 1, wherein said compressing includes applying a grammar-based code.

10. A method according to claim 9, wherein said applying includes employing a YK algorithm.

11. A method according to claim 1, wherein said compressing includes bit plane encoding quantized transform coefficients obtained from the video data set.

12. A method according to claim 11, wherein said compressing includes performing a run-length encoding of bit planed encoded coefficients.

13. A method according to claim 1, wherein said homogeneous files have similar statistical properties.

14. A method according to claim 1, further comprising multiplexing the separate files into a bit stream.

15. A method according to claim 14, further comprising prefixing a corresponding header to each of the separate files, said header indicating a size of a corresponding separate file.

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16. A computer-readable medium bearing instructions for compressing video, said instructions being arranged, upon execution by one or more processors, to perform the steps of the methods as in any of claims 1-15.

17. A video compression system, comprising:
means for grouping video frames that are only between consecutive I-frames into a video data set;
means for splitting the video data set into a plurality of homogeneous files; and
means for individually compressing each of the homogeneous files.

18. A video compression system according to claim 17, further comprising:
means for multiplexing the individually compressed files into a bit stream.

19. A method of compressing video, comprising:
grouping video frames that are only between two consecutive I-frames into a video data set;
splitting the video data set into a plurality of individual data sequences; and
individually compressing each of the individual data sequences.

20. A method according to claim 19, wherein at least one of the individual data sequences contains information from each of the video frames that are only between the two consecutive I-frames.

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21. A method of compressing video, comprising:

splitting the video data set consisting of non-intra video frames into a plurality of data sequences; and

individually compressing each of the files, wherein at least one of the data sequences contains information from each of the non-intra video frames.

22. A method of compressing a video signal, comprising:

grouping video frames of the video signal that are only between consecutive I-frames into a video data set;

splitting the video data set into a plurality of individual data sequences; and

individually compressing each of the individual data sequences.

23. A method according to claim 22, further comprising multiplexing the individual data sequences into a bit stream.

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EVIDENCE APPENDIX

(none)

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RELATED APPEALS AND INTERFERENCES APPENDIX

(none)